



## From the President

### Structure determines function – excellence in chemistry

One of the first things that I learnt as an organic chemist was that subtle changes in molecular structure will produce profound changes in molecular function. The chemical industry was built on this – a straightforward change to a dyestuff produced a pharmaceutical in a famous example. The number of possible chemicals is also very large. Contemplating only potential pharmaceuticals, published estimates of the number of theoretical small molecule drugs range as high as  $10^{66}$  – close to the number of atoms in the universe!

If we consider the large number of chemical structures possible and marry this with the concept that minor change can have major effect then there is an infinite array of ways that molecular structure can affect our lives. In my experience the size of chemical space is not well understood outside the realm of practising chemists and it is this lack of understanding that can be one problem in comprehending just how fundamental chemistry is in our world.

This chemical space issue is, of course, one of the great attractions of chemical research – there is an infinite molecular architecture possible and thus the development of new chemical technologies may have application across many fields. There is, however, an increasing pressure on research and development funding mechanisms to ‘focus’ our efforts onto particular and specific outcomes. That is, our research ‘must’ be targeted to one product, one industry or one nation.

Research that is too tightly linked to one sector without an eye to broader application is better suited to product development rather than to the discovery of new products, processes or benefits. It is critical that we explain this clearly as we plan our industrial future and that we ensure that our capability to do fundamental work in the design, synthesis and analysis of molecules is deepened in a balanced way. The more that is understood about any chosen area of fundamental chemistry the more molecules can be made and the more likely we are

to find applications for the science, outside our first target.

In a recent column I questioned the balance in Australia of fundamental research against harvesting the work of others (comparing my recent observations of research in broader Asia to that in Australia). These paradigms paint the extremes of a spectrum of course and I was partly hoping to evoke a response to generate some debate.

I did receive some good feedback which I appreciated and there is certainly world-leading fundamental research going on in chemistry in Australia.

I was also able to see the celebration of some of this success in fundamental science, and the benefits delivered, at the Prime Minister’s Science Awards in Canberra in early October. The Prime Minister’s Prize was awarded to Professor David Boger for his contributions to chemical engineering, the Prize for Life Scientist of the Year went to Professor Harvey Millar for work in proteomics and the Malcolm McIntosh Prize for Physical Scientist of the Year to Associate Professor Cameron Kepert for his many contributions to chemistry.

Cameron Kepert has of course been an active participant of RACI and an enthusiastic champion of chemistry in our society. His research has application in diverse fields including energy storage, agriculture and electronics. He spoke eloquently of this on receiving his award. It was also pleasing that professors Millar and Boger commented on the central role chemistry played in their lives and their work. At the awards ceremony Mr Mark Merrit and Mr Mike Roach were recognised for excellence in science teaching. Our teachers are critically important to the maintenance of excellence in science.

The Prime Minister’s Awards night was on the evening of the day that Barry Marshall and Robin Warren were announced as our newest Nobel laureates. Science is on the agenda in Australia more than it ever has been. Chemistry is a central part of that science and there is much to be excited about and to look forward to!

Merry Christmas; have a wonderful, safe holiday season.